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Extruder for Thermoplastic Media

The invention is concerned with an extruder for plasticizing thermoplastic media that is provided at its one end with a granule inlet in an inlet zone and at its opposite end with an outlet bore, also with a motor-driven threaded spindle that is disposed within a jacket with an opposite jacket thread.

An extruder of this type is known from DE 44 00 330 A1. It is designed for plasticizing and foaming amylaceous bran or farine starting substances. The opposite threads in the jacket and in the spindle cause a pronounced shearing stress on the loaded granular substances, which are compacted under significant pressure of the spindle rotation and become very warm due to the stress.

The energy efficiency is nearly 90%. The spindle and the jacket widen towards the outlet and make increasingly more room available for the plastified and liquefied material to foam with the aid of the moisture contained in the material, which starts to evaporate.

Also known are cylindrical spindle extruders that have a constant free thread cross section and introduce plasticizing energy into thermoplastic plastic due to the friction of the conveyed mass at the jacket and in the thread. The spindles have a relative large length to diameter ratio and have

an unfavorable efficiency regarding the absorption of plasticizing energy; the jacket heats up. The blending of the liquefied and still molten material takes place very slowly and the work therefore takes place near the critical overheating threshold of the material, thus aggravating the operation.

It is the object of the invention to present a new usefulness for the extruder that has so far been used to foam amylaceous products, and improvements for the extrusion specifically of thermoplastic plastics.

The solution is presented in the characteristic of the main claim.

Advantageous embodiments are presented in the subclaims.

The usability of the above described extruder that has so far been used for amylaceous products, to plasticize thermoplastic plastics has been discovered by surprise. The known extruder is significantly shorter than the customary single-shaft or two-shaft extruders that are used for plastics. Furthermore, its efficiency is significantly higher, and owing to the better blending during the conveyance against the opposite thread, no local overheating of the material occurs; the temperature increase above the plasticizing temperature is only approximately 10°C.

The opposite threads of the spindle and the jacket create a material flow back and forth between them. The material flow is facilitated if the flank of the thread land is flattened against the direction of conveyance to facilitate a forward flow of the mass and especially in order to enhance a wedge effect during the transition into the other thread.

A variant of the sloped flanks produces a concave half round thread that is entered into the spindle or the jacket, with the other thread being approximately a trapezoidal thread. The half-round thread is designed with a relatively narrowly tapering land.

The two threads are preferably designed with a different number of starts, e.g., two to three or two to four.

In an advantageous embodiment, the free total thread cross section per spindle length section is constant, however, the distribution of the cross section portions between the opposite threads along the length of the spindle is different due to depth variations. It increases from 10% to 90% and decreases from 90% to 10% on the other side. In this manner a portion of the mass that is contained in the flattening thread turn, and that was just subjected to shear stress, is taken over bit by bit into the deepening thread.